Correction Equations

1st order:

$$
\begin{aligned}
r_1^{obs} &= r_1[1 - 2P(1\ 1^{st}_{pg}) - 3P(2\ 1^{st}_{pg}) - P(1^+\ non1^{st}_{pg})] \\
&= r_1[1 - 2P(1\ 1^{st}_{pg}) - 3P(2\ 1^{st}_{pg}) - (1 - P(0\ non1^{st}_{pg}))] \\
&= r_1[1 - 2(k_p + k_g)r_1 e^{-r_1(k_p+k_g)} - \frac{3}{2!}(k_p + k_g)^2 r_1^2 e^{-r_1(k_p+k_g)} - (1 - e^{-r_{non1}(k_p+k_g)})] \\
&= r_1[e^{-r_{non1}(k_p+k_g)} - 2(k_p + k_g)r_1 e^{-r_1(k_p+k_g)} - \frac{3}{2}(k_p + k_g)^2 r_1^2 e^{-r_1(k_p+k_g)}]
\end{aligned}
$$

where r_{non1} means the rate for all orders in that slice of spectrum except 1st.

2nd order:

$$
\begin{aligned}
r_2^{obs} &= r_2[1 - 2P(1^+\ 2^{nd}_{pg}) - P(1^+\ non2^{nd}_{pg})] + r_1 P(1\ 1^{st}_{p}) \\
&= r_2[1 - 2(k_p + k_g)r_2 e^{-r_2(k_p+k_g)} - (1 - e^{-r_{non2}(k_p+k_g)})] + r_1^2 k_p e^{-r_1 k_p}
\end{aligned}
$$

3rd order:

$$
\begin{aligned}
r_3^{obs} &= r_3[1 - 2P(1^+\ 3^{rd}_{pg}) - P(1^+\ non3^{rd}_{pg})] + r_2 P(1\ 1^{st}_{p}) + r_1 P(1\ 2^{nd}_{p}) \\
&= r_3[1 - 2(k_p + k_g)r_3 e^{-r_3(k_p+k_g)} - (1 - e^{-r_{non3}(k_p+k_g)})] + r_2 r_1 k_p e^{-r_1 k_p} + r_1 r_2 k_p e^{-r_2 k_p}
\end{aligned}
$$

etc...

Solve for true rates iteratively.